EMPIRICAL ROVIBRATIONAL ENERGY LEVELS OF METHANE UP TO POLYAD 6

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An extensive analysis of the available spectroscopic data on methane is being performed. The MARVEL (Measured Active Rotational-Vibrational Energy Levels) algorithm by Furtenbacher et al [1] is used to provide accurate empirical rovibrational energy levels for methane. Experimental data are collected from 280 sources of which 159 provided useful data; these sources are evaluated and then added to a database of measured transitions with their experimental uncertainties. Each transition must have assigned quantum numbers for their upper and lower states and an uncertainty. A definitive transition list is being built starting from lower polyads and moving towards higher polyads and used as an input for MARVEL. The self-consistency of the input transitions is evaluated during the MARVEL procedure, and the uncertainties are adjusted accordingly until a self-consistent network of energy levels is achieved. As part of this process, the wrongly assigned or inaccurate transitions are either corrected or removed. The output of the procedure is a set of empirical energy levels with their respective uncertainties, derived from the inversion of the input measured lines which will be used to produce an improved Exomol line list suitable for high resolution studies. At the same time, the resulting energy levels will be used for the attribution of quantum numbers to unassigned experimental transitions.

[1] doi:10.1016/j.jms.2007.07.005, Tibor Furtenbacher, Attila G. Császár, Jonathan Tennyson, *J. Mol. Spectrosc.*, **245**, 115-125, (2007).

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